Assessing the potential of wild foods to reduce the cost of a nutritionally adequate diet: An example from eastern Baringo District, Kenya

Céline Termote, Jessica Raneri, Amy Deptford, and Bruce Cogill

Abstract

Background. *Wild foods and their actual and potential contributions to nutrition security have rarely been studied or considered in nutrition and conservation programs.*

Objective. *To study the role of wild food biodiversity in achieving a cost reduction of a nutritionally adequate diet for women and young children in Kenya using linear programming.*

Methods. *An ethnobiological inventory of available food biodiversity was carried out by means of focus group discussions, and five wild foods were selected for further modeling. A market survey assessed available food prices by season. Diets were modeled to minimize cost and maximize nutrient adequacy using the Cost of Diet linear programming tool. Modeling was done without and with wild foods.*

Results. *The modeled diets without wild species were deficient in iron for all age groups during the dry season, deficient in vitamin* B_6 *and calcium for infants aged 6 to 8 months during the dry season, and deficient in iron and zinc for infants aged 6 to 8 months over the whole year. Adding wild foods, especially* Berchemia discolor, *to the modeled diets resulted in a lower-cost diet, while meeting recommended iron intakes for women and children between 12 and 23 months of age. Even after integrating wild foods into the model, targeted approaches are needed to meet micronutrient requirements for infants from 6 to 8 and from 9 to 11 months of age.*

Conclusions. *An application of linear programming to screen available wild foods for meeting recommended nutrient intakes at a minimal cost was illustrated. This type of study helps to objectively assess the potential of biodiversity to contribute to diets and nutrition.*

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Key words: Cost of Diet, food biodiversity, linear programming, nutrition security, wild foods

Introduction

The determinants of poor nutrition are often rooted in poverty and inequity. Meeting nutrient needs of families while keeping costs to a minimum, improving resilience, and respecting cultural traditions remains a challenge. For many populations, local and traditional foods, including wild foods, can play an important role as a safety net during difficult periods or to complement diets with essential nutrients [1–3]. However, for most of these species, little is known about their nutritional value, safety, availability, use, and consumption patterns and their subsequent impact on human health, undernutrition, overnutrition, and risk of noncommunicable disease.

The present study innovatively brought together the fields of ethnobiology, nutrition, and food security to study the role of wild, neglected, and underutilized species in achieving a cost reduction of a nutritionally adequate diet for women, pregnant women, lactating women, and young children 6 to 23 months of age (covering the 1,000-days window of opportunity) during the dry and wet seasons in the eastern region of Baringo District in Kenya. The study focuses on the "window of opportunity" from minus 9 to 24 months, because improving nutrition for this group has the highest impact on reduction of death and disease, with high returns to cognitive development, individual earnings, and economic growth [4].

The Cost of Diet (CoD) analysis tool, developed by Save the Children UK and based on linear programming work previously carried out by the World Health Organization (WHO), was used to screen five candidate species for their potential to reduce the cost of, and contribute to the nutrient requirements of, a culturally acceptable, nutritious diet.

Linear programming analysis is a powerful objective approach that is used to model complex multifactorial problems, including diet-related problems [5, 6]. It is a mathematical approach that optimizes (minimizes or maximizes) a linear function of a set of decision variables, while respecting multiple linear constraints [5]. Linear programming has been used in human nutrition to analyze economic constraints on human diets and the economic value of fortified food supplements [7–9], to analyze and optimize children's diets during complementary feeding [10], to develop food-based dietary guidelines [5], to identify key problem nutrients and design optimal food-based complementary feeding recommendations [6, 11], to analyze the energy density and optimize the nutrient density of a population's diet [12, 13], and to predict whether formulated complementary food products can ensure dietary adequacy [14]. Save the Children's CoD linear programming tool used in this study builds on local food prices and food availability data to determine what theoretical diet can fulfill specific people's nutrient needs at the lowest cost [8, 9]. To our knowledge, this is the first time that the tool has been used to screen neglected and underutilized foods, including wild foods, with regard to their potential to reduce the cost and/or contribute to nutrient adequacy of diets. Wild, neglected, and underutilized species and their actual and potential contributions to nutrition security have been rarely studied so far, and are therefore mostly not taken into account in nutrition and conservation programs and policies [15–17]. Wild, neglected, and underutilized species are not the silver bullet for all malnutrition problems, but in many cases they have the potential to contribute more than they actually do [18]*, given that they can be sustainably collected and/or domesticated without causing overexploitation and subsequent extinction. In addition, these foods have adapted to local environmental conditions and as part of the locally available agricultural biodiversity, their role in managing risk, building system resilience, and supporting household subsistence is more and more acknowledged. It is necessary to ensure that we explore and harness the best that local food systems have to offer in a cost-effective and sustainable manner. Effective food-based dietary strategies will be among the most sustainable nutritional interventions, as long as nutritionally adequate diets based on local foods can be successfully identified and promoted [5].

Kenya has diverse agroecological zones that contribute to a wide diversity of indigenous neglected and underutilized species. Maundu et al. [19] documented about 400 indigenous fruit species in the country, and Messina [20] reported traditional leafy vegetables, cereals, and legumes with excellent nutritive properties. Its broad and excellent variety of neglected and underutilized species, coupled with high rates of malnutrition [21], makes Kenya the ideal location to study the role of local foods in reducing the cost of meeting nutritional adequacy. The eastern region of Baringo District in the Rift Valley Province of Kenya was selected for the study (**fig. 1**). The Rift Valley Province has a persistently high rate of stunting (36%) in children under 5 years of age [21]. The objectives of the present study were to document the available food biodiversity in Churo and Tangulbei divisions in eastern Baringo District, including cultivated, neglected, underutilized, and wild plant and animal foods; and to select five priority wild, neglected, and underutilized species and determine their potential contributions to a cost reduction in relation to the nutritional gain (nutrient adequacy) of theoretically modeled diets using linear programming.

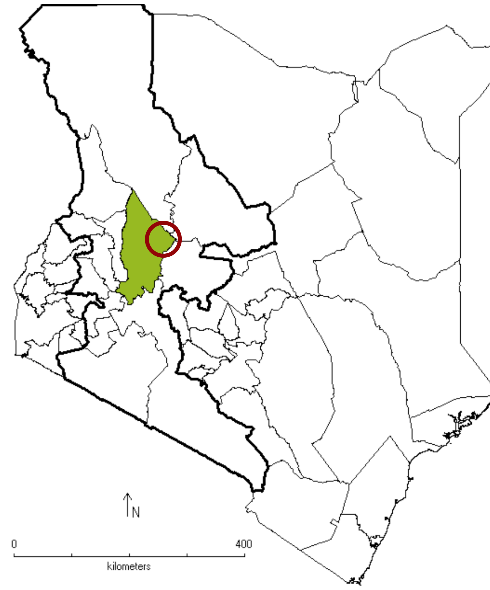

FIG. 1. Map of Kenya, showing the study region, the eastern region (circle) of Baringo District (shaded) in Rift Valley Province (bold line). Source: made in free-access DIVA-GIS software by first author (www.diva-gis.org)

Methods

Ethnobiology

An ethnobiological inventory of all available food biodiversity (including cultivated and wild plant and animal species) in the area was carried out by means of focus group discussions in 10 sublocations in Churo and Tangulbei divisions (5 sublocations in each division) in eastern Baringo District during the dry (February/March) and wet (July/August) seasons in 2012. Both divisions lie within the arid and semiarid

* Boedecker J, Termote C, Assogbadjo AE, Van Damme P, Lachat C. Dietary contribution of Wild Edible Plants to women's diets in Benin — an underutilized potential (submitted to Food Security).

ecological zones of Kenya, which are characterized by low rainfall and high temperatures [22]. Each focus group discussion involved 10 knowledgeable community members willing to participate after being orally informed about the research objectives. In each sublocation, the sex and age of the participants were balanced as much as possible. A list of all available food species was composed, and further information about vernacular names, habitats, plant and animal parts used, specific uses (fruit, vegetable, staple, etc.), seasonality, preparation and conservation, and availability was collected by semistructured interviews. Samples of lesser-known species (e.g., the wild species) were collected for further identification by botanists at the National Museums of Kenya.

Five wild plant species were selected for subsequent modeling in the CoD analysis based on their availability and abundance in both the dry and the wet seasons, availability and quality of their nutrient profile, and preferences of the local population.

Cost of Diet analysis

The CoD tool uses Excel's solver function to perform linear minimization of the cost of a modeled diet while respecting a number of "nutrient constraints" based on recommended energy and nutrient requirements. Two standard databases are incorporated in the tool: the World Food Composition Database (Food and Agriculture Organization [FAO], World Food Dietary Assessment System) and the FAO/WHO-recommended individual energy and nutrient requirements for different age, sex, and physiological condition groups [23, 24]. The food composition table in the CoD tool gives the nutrient contents of foods, except for iron and calcium, for which it gives bioavailability values instead of total contents [25]. For the five selected wild foods, nutrient contents, including assumed absorbed levels of iron and calcium, were entered manually, as they were not present in the CoD food composition table. To convert total dietary calcium into absorbed calcium in accordance with the food composition table in the tool, a coefficient was applied depending on the food group: 0.45 for fruit and 0.05 for green leafy vegetables. The food composition table in the CoD software assumes that only 10% of dietary iron is absorbed, which is typical for a mixed, but mostly vegetarian diet [24]. The total iron quantities in each food were thus multiplied by 0.1.

The CoD tool requires a comprehensive list of all locally available foods and their prices (per 100 g of edible portion) and offers the opportunity to refine the diet to make it culturally acceptable and palatable using constraints on the number of times a specific food portion can be included in the diet per week as well as on the portion size that is to be applied by the software every time the food is included ("food constraints"). Two types of food constraints can be defined: the "maximum constraint," representing the maximum number of times a food can be included in the diet, and the "minimum constraint," indicating the minimum number of times a food can be included in the modeled diet [25]. Portion sizes are available in the CoD tool for a breastfed child 12 to 23 months of age. Portion sizes are automatically adjusted by the tool for individuals of different ages, sexes, and/or activity levels based on energy requirements. Based on these data, the software calculates a Minimum Cost Nutritious (MCNut) diet (with no "food constraints" defined by the user: the tool sets the minimum constraint on each food to 0 and the maximum constraint to 21 portions per week [3 times per day x 7 days per week]) and a Locally Adapted Cost Optimized Nutritious (LACON) diet (with user-defined minimum and maximum food constraints reflecting local food preferences and consumption behaviors).

To compose a comprehensive list with all available foods and assess local prices, a market survey was conducted in six villages in Tangulbei Division in June for the dry season and in August for the wet season. Mean market prices per 100 g of edible food product were calculated. To identify culturally acceptable average consumption frequencies of all foods, individual interviews and focus group discussions were organized in seven villages in Tangulbei Division. Each village group consisted of eight women from four different wealth groups identified by the village chief. Minimum and maximum constraints were defined based on these data and as described in the CoD manual [25].

Information from the market survey and minimum and maximum constraints were entered into the CoD analysis software. LACON diets were modeled separately for each of the following reference individuals: an infant of either sex aged 6 to 8 months; an infant of either sex aged 9 to 11 months; a young child of either sex aged 12 to 23 months; an adult, nonpregnant, nonlactating woman, moderately active; an adult woman, moderately active and lactating; and an adult woman, moderately active and pregnant. For partially breastfed infants and young children (6 to 23 months of age), WHO-recommended breastmilk intakes were modeled in the diet. In addition to cost calculations, the program also highlights which recommended nutrient intakes cannot be met using only locally available foods during the dry and/or wet seasons. It needs to be emphasized that the modeled diet is hypothetical and does not necessarily reflect actual dietary intakes of the studied population.

The analysis was run for both the dry and the wet seasons, each time with and without the five selected wild foods to assess their impact on the cost of a nutritionally adequate diet. Each wild food was included separately in the hypothetical LACON diet, and then all foods were included together to examine their separate and collective effects on the cost and nutrient adequacy of the diet. It was assumed that the wild foods had no monetary value and that each wild food would be consumed at least three times a week, as indicated during the focus group discussions. The minimum constraint for each wild food was therefore set at three and the maximum constraint was set at four. It was recognized that there may be opportunity costs involved in collecting and preparing wild foods, but these data were not collected.

Results

Ethnobiology

A total of 177 edible plant species (14 cereals, 28 roots and tubers, 11 pulses, 67 fruits, and 55 vegetables), 38 animal species (9 insects, 18 mammals, 8 birds, and 3 reptiles), and 11 mushroom species were recorded throughout the year. Of these, 121 plant species from 54 different botanical families and 26 animal species could be taxonomically identified. Seventy-eight plant species and 7 mushroom species were exclusively found in the wet season, whereas only 9 plant species and no mushroom species were exclusively found in the dry season (**appendix 1A–C**).

The wild foods selected for modeling their effect on the cost of a nutritionally adequate diet were *Solanum nigrum* L., a wild leafy vegetable, and four wild fruits: *Balanites aegyptiacus* (L.) Delile, *Ximenia americana* L., *Berchemia discolor* (Klotzsch) Hemsl., and *Ziziphus mauritiana* Lam. (**fig. 2**). Their energy and nutrient composition per 100 g is shown in **table 1** [26–28].

Cost of Diet analysis

Fifty-seven different food products from 27 plant and 7 animal species were inventoried during the market survey, of which 44 were found in both seasons, 7 were unique to the dry season, and 6 were unique to the wet season.

The daily cost of a hypothetical optimized LACON diet, without wild foods, and the percentage cost reduction produced by adding each of the five selected wild foods separately and all selected wild foods together in the model are presented in **table 2**. Simultaneously, the CoD analyses generated the percentage of recommended nutrient intakes met by the modeled diets without wild foods and the percentage of recommended nutrient intakes met by the modeled diets for which each wild food separately or all wild foods together were added to the model. Of all wild foods modeled, *B. discolor* (a fruit tasting like dates, also called bird plum or wild almond, widespread from Sudan to South Africa growing in dry open woodland, semiarid bushland, and along riverbanks) contributed most to reaching the recommended nutrient intakes. **Figure 3** presents the percentage of nutrient requirements met by the modeled diet without wild foods and the additional percentage of nutrient requirements met by including all five wild foods together or the wild fruit *B. discolor* alone in the modeled diet for the dry and wet seasons.

The results of the CoD analysis without and with wild plants can be summarized as follows:

The wet season is the lowest-cost season, because foods are available in higher quantities during the wet season harvest period.

By design, the diets without the five wild species were modeled to meet the energy requirements and recommended nutrient intakes for protein, vitamins A, B_1, B_2, B_3, B_6, and B_{12}, folic acid, calcium, magnesium, iron, and zinc. The resulting diets were, however, limited by several essential micronutrients, especially for infants aged 6 to 8 months (vitamin B_6 and calcium deficient during the dry season, iron and zinc deficient over the whole year). The diets were deficient in iron for all age groups (women, lactating women, pregnant women, and infants and young children) during the dry season.

The selected five wild foods have the greatest impact on the daily cost of the diet when modeled together. There is potential to reduce the daily cost of a woman's diet by 120 to 175 KSh (US$1.5 to 2.00) per day

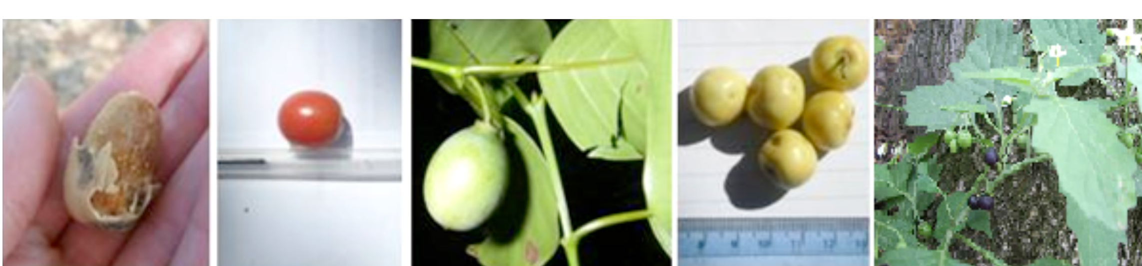

FIG. 2. Five selected wild edible plant species for modeling in the Cost of Diet tool: from left to right: *Balanites aegyptiacus* (L.) Delile (Tuluny, Tuyunwo); *Ximenia americana* L. (Kinyat, Kunyotwo); *Berchemia discolor* (Klotzsch) Hemsl.; *Ziziphus mauritiana* Lam. (Tulomwo/tilomwo) and *Solanum nigrum* L. Source: A. Deptford (1, 2, 4), Missouri botanical gardens (3) and H. Hubich (5) (http://creativecommons.org/licenses/by-sa/3.0/)

TABLE 1. Energy and nutrient composition per 100 g for the five selected wild foods

Species	Food type	Local name	Energy (kcal)	Protein (g)	Fat (g)	Absorbed calcium (mg)	Magnesium (mg)	Zinc (mg)	Absorbed iron (mg)	Vitamin B_1 (mg)	Vitamin B_2 (mg)	Niacin (mg)	Vitamin C (mg)	Retinol equivalents (µg)[a]
Balanites aegyptiacus	Dried	Tuluny, tuyunwo	275.0	5.0	0.10	63.45[a]	n/d	0.89	0.31	0.20	0.11	1.70	35.00	n/d
Ximenia americana	Raw	Kinyat, kunyotwo	132.9	2.80	0.80	3.41[a]	31.10	n/d	0.13	n/d	n/d	n/d	69.70	56.66
Solanum nigrum	Raw	Ksocho	33.9	4.41	0.80	12.60[b]	461.00	n/d	0.46	0.06	0.04	0.50	25.00	305.0
Berchemia discolor	Raw	Muchuk	n/d	0.99	2.80	8.44[a]	21.26	n/d	3.42	n/d	n/d	n/d	65.00	n/d
Ziziphus mauritiana	Raw	Tilam, tilomwo (raw)	23.2	1.90	Trace	22.95[a]	n/d	n/d	n/d	n/d	n/d	n/d	58.00	n/d

n/d, No data available

Table compiled from multiple sources [26–28].

a. Calcium coefficient = 0.45.

b. Calcium coefficient = 0.05; β–carotene:retinol equivalent conversion rate = 1:12.

when the five wild foods together are added to the model.

The wild species *B. discolor* has the biggest impact on the cost of the diet when modeled on its own. By adding this fruit to the diet three or four times a week, the daily cost of the diet could potentially be reduced by 54% to 57.5% for women in both seasons and by 56% for children aged 12 to 24 months in the dry season. For infants under 12 months, the reduction in the cost of diet is negligible. *B. discolor* contributed to meeting recommended iron intakes by 100% for women, lactating women, pregnant women, and children aged 12 to 24 months. However, it was still not possible to meet recommended iron and zinc intakes for the partially breastfed 6- to 8- and 9- to 11-month-old infants.

The selected wild foods made little contribution to vitamin B_6 and calcium requirements for 6- to 8-month-olds in the dry season. This may be because portion sizes of the foods for these children are too small to make a significant contribution to nutrient intakes or the nutrient levels in the foods are too low to make a difference.

Discussion

The present study was able to answer three basic questions: Is it theoretically feasible to meet energy and nutrient requirements in all seasons using only locally available food? If this is possible, what are the food combinations that make this possible and at what cost? What is the effect of adding five selected wild edible plants to the modeled diets on dietary adequacy as well as cost? The results showed that for all age groups, it was not possible to meet iron requirements in the dry season without the addition of wild foods. With or without wild foods, iron and zinc represent problem nutrients for the partially breastfed 6- to 8- and 9- to 11-month-old infants in both the dry and the wet seasons. In addition, vitamin B_6 and calcium are problem nutrients for 6- to 8-month-old infants in the dry season, with or without wild foods. For the other age groups, adding wild foods to the modeled diets was able to close the iron gap. Meeting nutrient requirements for 6- to 11-month-old infants using only local foods has proven to be difficult in other studies [6, 11, 29]. However, adding up all the "small" contributions during the critical window of 1,000 days might have a greater impact than each small contribution in itself.

Linear programming, as used in this study, is a useful tool to objectively assess the feasibility and affordability of meeting nutrient requirements by combining locally available foods [29]. If it appears to be impossible to combine local foods to fulfill all nutrient needs, linear programming could also be used to objectively compare additional strategies (introduction of new species to the area, biofortification, food fortification,

TABLE 2. Daily cost of a modeled nutritious diet without wild foods and percentage reduction of daily cost from integrating five wild foods in the model for the dry and wet seasons in Baringo District, Kenya

Group	Daily cost and percentage reduction of cost during dry season (KSh)[a]						
	Without wild foods added	*Balanites aegyptiacus*	*Ximenia americana*	*Berchemia discolor*	*Ziziphus mauritiana*	*Solanum nigrum*	All wild foods together
6–8 mo	20.6	−8.3	−1.9	0.0	−0.5	−0.5	−10.7
9–11 mo	36.0	−1.7	−4.2	1.9	1.9	0.3	−7.2
12–23 mo	62.3	−9.6	−2.7	−56.2	−0.6	−11.4	−64.0
Women	226.9	−14.7	−3.9	−54.6	−0.9	−0.9	−63.6
Lactating women	263.0	−12.7	−4.0	−57.0	−0.8	−0.8	−63.4
Pregnant women	277.9	−12.8	−4.0	−56.8	−0.8	−9.0	−62.9
Group	Daily cost and percentage reduction of cost during wet season (KSh)						
	Without wild foods added	*Balanites aegyptiacus*	*Ximenia americana*	*Berchemia discolor*	*Ziziphus mauritiana*	*Solanum nigrum*	All wild foods together
6–8 mo	16.2	1.9	0.0	0.0	0.0	0.0	5.6
9–11 mo	26.2	−5.3	−3.1	0.8	0.0	−0.4	−8.0
12–23 mo	44.3	−17.4	−3.8	−49.9	−0.7	−16.0	−54.6
Women	200.8	−0.9	−0.3	−53.9	0.0	−0.1	−61.3
Lactating women	239.5	−4.3	−0.8	−57.5	−0.5	−0.6	−62.2
Pregnant women	252.7	−4.3	−1.1	−56.6	−0.1	−18.8	−61.2

a. US$1 = 85 Ksh.

or supplements) to be implemented in a specific region for specific age groups in specific seasons [8, 9]. In the present case, the selected five wild foods were able to close the iron gaps for women, lactating women, pregnant women, and children aged 12 to 24 months; however, complementary approaches will be needed to meet micronutrient requirements for infants from 6 to 8 and 9 to 11 months of age (iron and zinc throughout the year and additionally vitamin B_6 and calcium in the dry season).

The foods that contributed to more than 5% of the total cost, energy, or nutrients of the theoretical optimized diets without wild foods are presented in **appendix 2**. The foods that accounted for the highest contributions to total diet costs for all age categories were milk (camel's milk only in the dry season and cow's milk), eggs, small dried fish, meat (goat and/or camel), and, in addition, tomatoes for women. Maize was the highest contributor to energy in the modeled diets for women and the second highest contributor to energy after breastmilk for infants and young children (6 to 24 months). Liver (from cows in the dry season and goats in the wet season), breastmilk, and kale were the largest contributors to vitamin A. Kale also contributed a great deal of vitamin C in the modeled diets. Folic acid was mainly provided by legumes, and breastmilk and small dried fish contributed substantially to protein, niacin, vitamin B_{12}, calcium, and zinc in the modeled diets.

The total number of food species available in the markets in eastern Baringo District was rather low in both seasons, especially vegetables. Wild foods have thus the potential to add diversity to the diet as well as to contribute to diet quality. In addition, wild foods lowered the cost of the modeled diets up to 64% for all five wild foods together in the dry season for 12- to 23-month-old children. Although income data were not collected, it is unlikely that poor households would be able to afford the modeled diets without the addition of wild foods. Therefore, there is potential for nutritious wild foods, available at low cost, to have a positive impact on the cost and quality of the diet if these foods contain the nutrients and are safe and accessible.

Some limitations should be mentioned regarding this exploratory study to screen wild foods for their potential in reducing the cost and contributing to nutrient adequacy of modeled diets using CoD software. Despite increased interest from the international research community, there is still a huge lack of food composition data for neglected and underutilized and wild species [15, 30, 31], which seriously restricted the choice and number of wild foods that came into scope for being modeled in this exercise. Second, this study was based on a number of assumptions that require

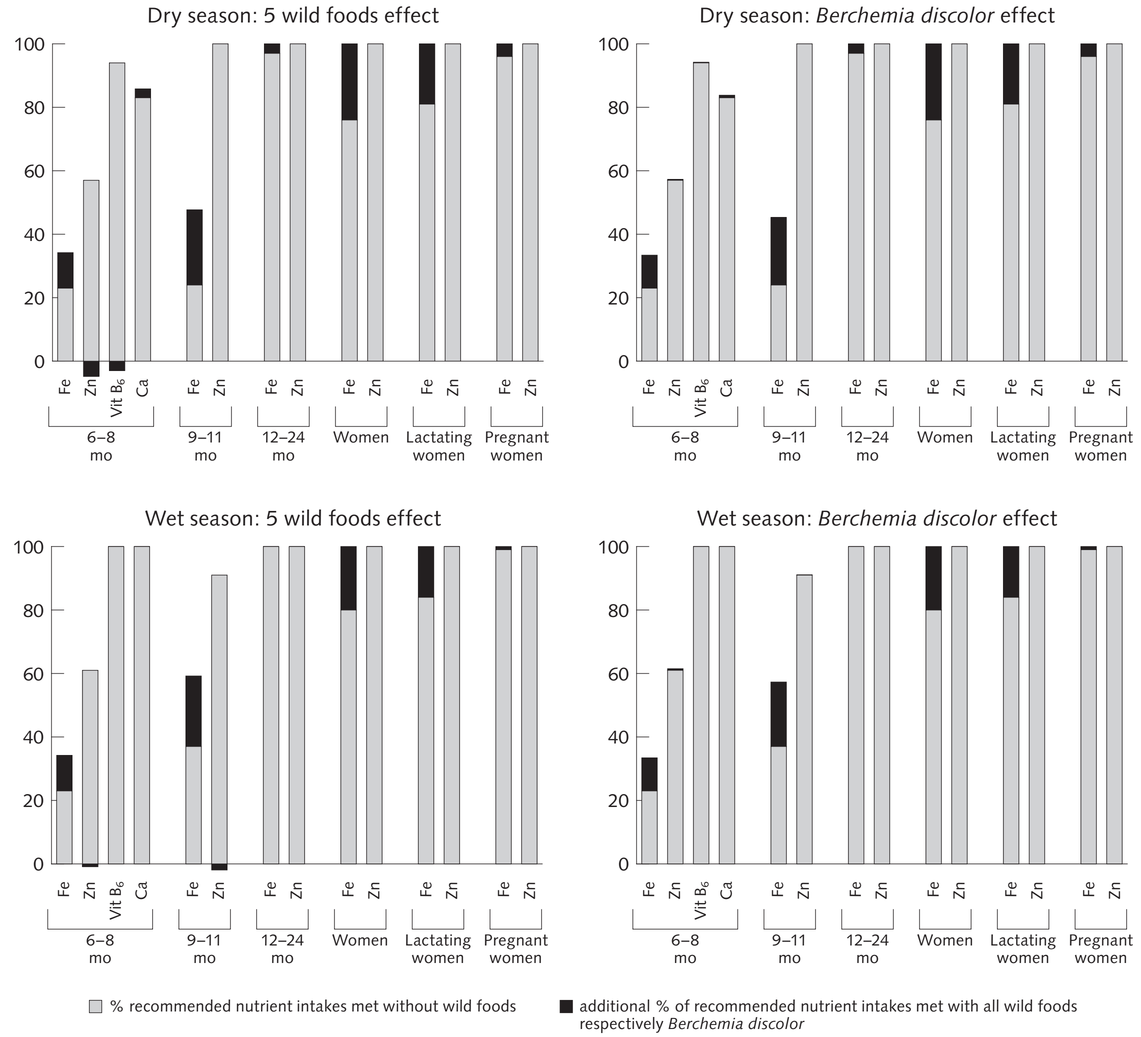

FIG. 3. Percentage of nutrient requirements met by the modeled diet without wild foods (only deficient nutrients are shown) and additional percentage of nutrient requirements met by including all five wild foods together or the wild fruit *Berchemia discolor* apart in the modeled diet for the dry and wet seasons in Baringo District, Kenya

further investigation. Information on the opportunity costs of wild food collection and processing was not gathered, so the selected wild foods were added to the models at a supposed zero cost. Furthermore, based on the focus group discussions with the women, it was decided that they would be "willing" to consume these foods up to three times per week and the portion sizes for similar foods available in the CoD software were used. In addition, much more agroecological research is needed to investigate the harvest levels and/or domestication possibilities that could identify and support sustainable levels of consumption of these foods.

Finally, this study provided us with critical insights into the theoretical possibilities of combining locally available and wild foods to obtain optimized diets at lowest cost in the eastern Baringo Region. However, despite the integration of food constraints to reflect culturally acceptable diets, the results can still substantially differ from actual or culturally acceptable dietary patterns. Additional participatory population-based research is thus necessary to assess whether the resulting modeled diets can be translated into dietary guidelines and whether these are actually affordable, culturally acceptable, safe, and sustainable.

Conclusions

The study illustrated an application of the CoD tool to screen available wild foods for meeting energy requirements and recommended nutrient intakes at a minimal cost in different seasons. Repeating the study in different agroecological settings with high malnutrition rates is needed to increase our understanding of, and provide evidence for, the multiple links between biodiversity, nutrition, and health. In addition, scalable projects that aim to increase the availability of, and access to, wild, neglected, and underutilized species for safe and sustainable production and consumption should be developed, and the impact of increased consumption on various livelihood, food-security, and nutritional outcomes should be measured.

Acknowledgments

The present study was carried out by Bioversity International in collaboration with Save the Children UK and the National Museums of Kenya and was supported by the Bill & Melinda Gates Foundation and the Agriculture for Nutrition and Health CGIAR research program. J. Fanzo and F. Mattei helped with development of the project idea. Ethnobotanical research was carried out under the supervision of J. Mutangah of the National Museums of Kenya, and the Cost of Diet analysis was performed by A. Deptford, C. Kimere, and S. Muguro under the supervision of A. Hall and J. Grace of Save the Children UK. C. Termote, J. Raneri, A. Deptford, and B. Cogill were in charge of data analysis and manuscript development. We are grateful to all the participants in the focus group discussions and market surveys.

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APPENDIX 1A. Edible plant species known in Tangulbei and Churo divisions in eastern Baringo District, Kenya[a]

Botanical family	Scientific name	Vernacular name(s)[b]	Habitat	Specific use	Part used	Seasonality	Preparation	Conservation	Availability
Acanthaceae	*Justicia odora* Lam.	Lopara/lopero (c)	Wild	Fruit	Fruit	Jul–Sep			Scarce
	Justicia sp. L.	Kembatarit (h)	Wild	Vegetable	Leaves	Apr–Jun	Boiled	Pickled	Abundant
Amaranthaceae	*Achyranthes aspera* L.	Chesirimiion (a, e)	Wild	Vegetable	Aerial parts, leaves	Jan–Mar, Jul–Sep	Dried	Pickled	Moderate
	Amaranthus thunbergii	Kelp kukuy (f), ptanya (a, c, f, g, h, j)	Wild	Vegetable	Leaves	Jan–Sep	Boiled, dried	Sun-dried	Scarce, moderate, abundant
	Beta vulgaris L.	Beet spinach (c)	Cultivated	Vegetable	Leaves	Apr–Jun			
	Celosia anthelminthica Aschers.	Keriyontus (f)	Wild	Vegetable	Leaves	Jul–Sep	Boiled	Sun-dried	Scarce
	Digera muricata (L.) Mart.	Kaprimet, cheriyan, chererayan (f)	Wild, cultivated	Vegetable	Flower, leaves	Jan–Mar			Scarce
	Spinacia oleracea L.	Spinach (c)	Cultivated	Vegetable	Leaves	Apr–Jun	Dried	Sun-dried	Abundant
Amaryllidaceae	*Allium cepa* L.	Ktungu	Cultivated	Vegetable	Bulb, leaves		Dried	Sun-dried	Moderate
Anacardiaceae	*Lannea fulva* Engl.	Lalat (e)	Wild	Fruit	Fruit	Jul–Sep	Dried	Sun-dried	Scarce
	Lannea schimperi (Hochst. ex A. Rich.) Engl.	Cheprukwa (j), cheprukwo, cheprukwa (h)	Wild	Fruit	Fruit	Jul–Sep			Abundant
	Lannea schweinfurthii Engl.	Moino (e, f)	Wild	Staple	Root	Jan–Mar			
	Lannea triphylla Engl.	Tapoyo (e, f), tobayo, moino (f)	Wild	Fruit, staple	Fruit, root	Jan, Jul–Dec	Boiled, dried	Pickled, sun-dried	Moderate
	Mangifera indica L.	Maembe (j), mango (h)	Cultivated	Fruit	Fruit	May, Jul, Oct–Dec	Raw	Pickled	Moderate
	Rhus natalensis Bernh.	Seria (d, j), siria (d, e, g, j), siriewo (d, f, g, j)	Wild	Fruit, pulse	Fruit	Jan–Dec	Dried, ripe	Pickled	Scarce, moderate
	Sclerocarya birrea (A. Rich.) Hochst.	Arol (a, h)	Wild	Fruit, gum	Fruit, seed	May, Jul–Sep	Dried	Pickled	Moderate, abundant
Apiaceae	*Daucus carota* L.	Karati (c)	Cultivated	Vegetable	Root		Dried	Sun-dried	Scarce
Apocynaceae	*Acokanthera schimperi* (A. DC.) Benth. and Hook. f.	Kelion (d, j)	Wild	Fruit	Fruit	Apr–Sep	Dried	Pickled	Moderate
	Caralluma sp.(R. Br.)								

continued

APPENDIX 1A. Edible plant species known in Tangulbei and Churo divisions in eastern Baringo District, Kenya[a] *(continued)*

Botanical family	Scientific name	Vernacular name(s)[b]	Habitat	Specific use	Part used	Seasonality	Preparation	Conservation	Availability
	Caralluma vibratilis (E. A. Bruce and P .R. O. Bally)	N/d (d)							Abundant
	Carissa edulis (Forssk.) Vahl	Aletelete (b), lakalet (b, c, d e, g, i, j), lakatetwa (b, c, e, f, g, i, j), lokotetwo (b)	Wild	Fruit, vegetable	Fruit, root	Jan–Sep, Nov	Ripe	Sun-dried	Scarce, moderate
	Ceropegia cufodontii Chiov.	Kamarmur (b, d), kipkodo (f)	Wild	Staple	Root	Jan, Jul–Sep, Nov	Boiled, dried	Pickled, sun-dried	Scarce
	Pergularia daemia (Forssk.) Chiov.	Kutitany (a)	Wild	Vegetable	Leaves, stem	Apr–Jun	Dried	Pickled	Scarce
	Sarcostemma viminale (L.) R. Br.								
Araceae	*Colocasia esculenta* (L.) Schott	Nduma (d)	Wild	Vegetable	Root		Boiled	Pickled	Moderate
	Stylochiton angustifolius Peter	Parakach (f)	Wild	Vegetable	Leaves	Jul–Sep			
Asteraceae	*Galinsoga parviflora* Cav.	Chepsitaki (d, e, h)	Wild	Vegetable	Leaves, stem	Apr–Sep	Cooked	Sun-dried	Scarce, abundant
Basellaceae	*Basella alba* L.	Akan (i), rachan (b, e)	Wild	Vegetable	Leaves, root, shoot	Mar, Jul–Sep, Dec	Dried	Sun-dried	Scarce
Boraginaceae	*Cordia coriacea* Killip			Fruit	Fruit				
	Cordia monoica Roxb.	Taparer (a, j)	Wild	Fruit, cereal	Fruit, seed	Jul–Sep	Dried	Pickled, sun-dried	Moderate
	Cordia sinensis Lam.	Adome (b, e, f)	Wild	Fruit	Fruit	Mar–Sep, Dec			Scarce, moderate
Brassicaceae	*Brassica oleracea var. acephala* DC.	Kapich (i), sukuma wiki (b)	Cultivated	Vegetable	Leaves	Jul–Sep			
	Brassica oleracea var. capitata L.	Cabbage	Cultivated	Vegetable	Leaves				
	Brassica sp.	Kales (h)	Cultivated	Vegetable	Leaves	Apr–Jun	Cooked	Sun-dried	Scarce
	Farsetia stenoptera Hochst.	Kisursur (b, e, g, h)	Wild	Vegetable	Leaves	Dec–Jan, May,			Scarce, moderate
Bromeliaceae	*Ananas comosus* (L.) Merr	Mananasi (c)	Cultivated	Fruit	Fruit	Apr–Jun	Raw	Pickled	Moderate
Burseraceae	*Commiphora africana* (A. Rich.) Engl.	Katagh, kallechuwa (g, h)	Wild	Staple	Root	May–Jun, gathering			Scarce, abundant

	Commiphora boiviniana Engl.	Masian (e)	Wild	Fruit	Fruit	Jul–Sep	Boiled	Sun-dried	Moderate
Capparaceae	*Boscia coriacea* Pax	Sorich (a,b, c, e, f, g, h, i), sorichin (c, g), sorichon (b, e, h, i)	Wild	Fruit, pulse	Fruit	Jan–Dec	Dried	Pickled, sun-dried	Scarce, moderate, abundant
	Capparis tomentosa Lam.	Kdow (i), kduwu (e, f, g, j), kudow (j), tipai (f), tipoyuo (e, f, g, j)	Wild	Cereal, fruit, vegetable	Fruit, leaves, seed	Jan–Sep	Dried	Pickled	Scarce, moderate
	Cadaba farinosa Forssk.	Chepulus (a), cheputusuwo (a), n/a (e, f, g)		Vegetable	Leaves				Scarce, moderate
	Maerua decumbens (Brongn.) DeWolf	Aruru, cheplis, (b, c, f, g, h, i, j), chepiliswo (c, f, g, h, i, j), chepuluswo (b)	Wild	Cereal, condiment, fruit	Fruit, root, seed	Dec–Mar, May–Sep	Dried	Pickled, sun-dried	Scarce, moderate, abundant
Caricaceae	*Carica papaya* L.	Paipai (e)	Cultivated	Fruit	Fruit	Jul–Sep			
Cleomaceae	*Cleome gynandra* L.	Sageti (d)	Wild	Vegetable	Leaves	Jul–Sep	Dried	Sun-dried	Moderate
Combretaceae	*Combretum* molle (R. Br. ex G. Don)	Kamol (d, g)		Vegetable	Root				
	Terminalia brownii Fresen.	Kolopcho (b, c, e, g, i, j), koloswo (j)	Wild	Cereal, fruit, root, tuber	Fruit, root, seed	Dec–Mar, May–Sep, gathering	Dried	Pickled, sun-dried	Scarce, moderate
Commelinaceae	*Commelina africana* L.	Katagh, kallechuwa, ndarama (d), ntararan (e), portotion (h)	Cultivated	Vegetable	Leaves	Apr–Sep	Boiled	Pickled	Moderate
	Commelina benghalensis L.	Portotion (b, c, j)	Wild	Vegetable	Leaves	Mar–Jun, Sep–Oct, Dec			Scarce
Convolvulaceae	*Ipomoea batatas* (L.) Lam.	Ngwache (i), potato leaves (d), sweet potato (j)	Cultivated	Staple, vegetable	Leaves, tuber	Apr–Sep	Pickled	Dried	Moderate
	Ipomoea longituba Hallier f.	Kaptirmam (h, f), kaptirmar (c), keptrimur (j), potatoes (a), viazi (j)	Wild, cultivated	Staple	Tuber	Oct–Mar, Jul–Sep	Boiled, dried, raw	Pickled, sun-dried	Scarce, moderate, abundant
	Ipomoea tuberosa L.	Irish potatoes		Vegetable	Tuber				
Cucurbitaceae	*Coccinia grandis* (L.) Voigt	Ariapongos (b, e)	Wild	Fruit, vegetable	Leaves, fruit	Jan–Feb	Boiled	Sun-dried	Scarce

continued

APPENDIX 1A. Edible plant species known in Tangulbei and Churo divisions in eastern Baringo District, Kenya[a] *(continued)*

Botanical family	Scientific name	Vernacular name(s)[b]	Habitat	Specific use	Part used	Seasonality	Preparation	Conservation	Availability
	Cucumis ficifolius A. Rich.	Kiprakach (e), kitutany (a, e), kparkach (i)	Wild	Vegetable	Fruit	Apr–Dec			
	Citrullus lanatus (Thunb.) Matsum. and Nakai	Water melon		Fruit	Fruit				
	Cucurbita maxima Duchesne	Pumpkin leaves (e)	Cultivated	Vegetable	Fruit, leaves	Apr–Jun			
	Momordica rostrata A. Zimm.	Cheprukwo (j)	Wild	Fruit, vegetable	Fruit, leaves	Apr–Jun	Raw	Pickled	Moderate
Cupressaceae	*Juniperus procera* Hochst. ex Endl.	Tipai							
Ebenaceae	*Diospyros scabra* (Chiov.) Cufod.	Chuwit (c, f), tuwit (f)	Wild	Fruit	Fruit	Jan, Mar, Jul–Sep			Moderate
	Euclea divinorum Hiern	Cheptuya (j)	Wild	Cereal	Seed	Apr–Jun	Dried	Pickled	Moderate
Euphorbiaceae	*Manihot esculenta* Crantz	Mihoko (e, h, j)	Wild	Staple	Tuber	Feb, Apr–Jun	Salted	Sun-dried	Scarce, moderate
Fabaceae	*Arachis hypogaea* L.	Nchuku (a, d), groundnuts (d)	Cultivated	Pulse	Seed	Jul–Sep	Dried	Sun-dried	Moderate
	Crotalaria deflersii (Schweinf.)								
	Crotalaria ochroleuca G. Don	Kamra (i), karelmot (a, h, i, j)	Wild	Vegetable	Leaves	Apr–Sep	Dried	Pickled	Scarce, moderate, abundant
	Delonix elata (L.) Gamble	Ririron (e)	Wild	Pulse	Seed	Jul–Sep			
	Phaseolus aureus Zuccagni	Akwa sos (b), dengu (j), green grams (d)	Wild, cultivated	Pulse	Seed	Jan–Sep, Nov			Scarce
	Phaseolus vulgaris L.	Bean leaves (d), marakwa (a)	Cultivated	Pulse, vegetable	Leaves, seed	Apr–Sep	Dried	Sun-dried	Moderate
	Pisum sativum L.	Pinsin (c)	Cultivated	Pulse	Seed	Apr–Jun	Dried	Sun-dried	Scarce
	Tamarindus indica L.	Aron (b, g, h), oron (a, b, e, g, h)	Wild	Fruit	Fruit	Feb–Mar, Jul–Sep, Dec, gathering	Boiled, dried	Pickled, sun-dried	Scarce, moderate
	Vigna membranacea A. Rich.	Cheswancha		Vegetable	Leaves, root				
	Vigna radiata (L.) R. Wilczek	Green grams (d, j), ndengu (d, j)	Cultivated	Pulse	Seed, seed pod	Jul–Sep	Dried, raw	Sun-dried	Scarce

	Vigna unguiculata (L.) Walp.	Kunde (d, e)	Cultivated	Pulse, vegetable	Pod, seed	Apr–Sep	Dried	Sun-dried	Moderate
Hydnoraceae	*Hydnora abyssinica* A. Braun	Aurieng'o (c, e, g), awurieng'o (f), kawo-riongo (c, e, g, f)	Wild	Fruit	Flower, fruit	Apr–Sep, gathering	Dried	Sun-dried	Scarce, moderate
Lauraceae	*Persea americana* Mill.	Avocado (d, e)	Cultivated	Fruit	Fruit	Apr–Sep	Raw	Pickled	Moderate
Leguminosae	*Vatovaea pseudolablab* (Harms) J. B. Gillett	Kelewo, kela (b, e, f, h, i)	Wild	Staple, vegetable	Leaves, root	Dec–Mar, May–Sep	Boiled, dried	Pickled, sun-dried	Scarce, moderate, abundant
Lythraceae	*Lawsonia inermis* L.								
Malvaceae	*Corchorus olitorius* L.	Chow (f), kudowa (e), sokeria (g), sokorya (f)	Wild	Vegetable	Leaves	Apr–Sep	Boiled	Sun-dried	Scarce, moderate
	Corchorus trilocularis L.	Chepkaratian (j)	Wild	Vegetable	Flower, leaves	Apr–Jun	Cooked	Pickled	Moderate
	Grewia bicolor Juss.	Simadado (j), sitit, sitet (d, g, i)	Wild	Fruit	Fruit	Apr–Jul, Dec	Dried	Pickled	Moderate, abundant
	Grewia tenax (Forssk.) Fiori	Taran (e, f, g, i), toronwo (g)	Wild	Fruit	Fruit	Jan–Jun, Oct–Dec	Boiled	Sun-dried	Scarce, moderate, abundant
	Grewia villosa Willd.	Makow (b, f), mokuwo (e, f)	Wild	Fruit	Fruit	Dec–Mar, Jul–Sep	Boiled, dried	Pickled, sun-dried	Scarce, moderate
	Triumfetta rhomboidea Jacq.	Churukuny (f)	Wild	Vegetable	Leaves, root, stem	Feb–Mar			Moderate
Moraceae	*Ficus* sp. L.	Makany (b, e, f, i)	Wild	Fruit	Fruit	Jan–Mar, May, Jul–Dec			Scarce, abundant
	Ficus sycomorus L.	N/a (h)		Fruit	Fruit				Moderate
Musaceae	*Musa* sp. L.	Ndizi (e, j)	Cultivated	Fruit	Fruit	Apr–Jul	Dried	Pickled	Moderate
Myrtaceae	*Syzygium cordatum* Hochst.	Reperwa (j)	Wild	Fruit	Fruit	Apr–Jun	Dried	Pickled	Scarce
Nymphaeaceae	*Nymphaea nouchali* Burm. f.	Alenger (f), narok (b), norokuwo (f)	Wild	Fruit, staple, vegetable	Flower, fruit, leaves, seed, tuber	Jul–Sep	Boiled, dried	Pickled, sun-dried	Scarce, moderate
Passifloraceae	*Adenia sp.*								
	Passiflora edulis Sims	Passion fruit (c)	Cultivated	Fruit	Fruit	Jan–Mar	Raw	Pickled	Scarce

continued

APPENDIX 1A. Edible plant species known in Tangulbei and Churo divisions in eastern Baringo District, Kenya[a] *(continued)*

Botanical family	Scientific name	Vernacular name(s)[b]	Habitat	Specific use	Part used	Seasonality	Preparation	Conservation	Availability
	Passiflora sp.			Fruit	Fruit				
Plumbaginaceae	*Plumbago zeylanica* L.	Keriyontus (f)	Wild	Vegetable	Leaves	Jul–Sep	Boiled	Sun-dried	Scarce
Poaceae	*Eleusine coracana* (L.) Gaertn.	Matai (a, e, f, h)	Wild, cultivated	Staple	Seed	May–Sep	Dried	Sun-dried	Scarce
	Sorghum bicolor (L.) Moench	Mosong (a, e, h)	Wild, cultivated	Staple	Seed	Mar, May–Sep	Boiled	Sun-dried	Scarce, moderate, abundant
	Triticum aestivum L.	Ngano (a)	Cultivated	Staple	Seed	Sep–Oct			Abundant
	Zea mays L.	Pembea (a, b, e)	Cultivated	Staple	Seed	Apr, Jul–Dec	Dried	Sun-dried	Scarce
Polygonaceae	*Oxygonum sinuatum*	Chementril (h)	Wild	Vegetable	Leaves	Jul–Sep	Cooked, dried	Pickled, sun-dried	Abundant
Portulacaceae	*Portulaca oleracea* L.	Kelpomough (f, i), tumeghio (a, h), tumeighio (f)	Wild	Vegetable	Leaves, stems	Mar–Dec	Boiled	Sun-dried	Scarce, moderate, abundant
Proteaceae	*Faurea saligna* Harv.	Malkat (c, e, f, g)	Wild	Fruit	Fruit	Jan–Mar, Sep, Nov			Scarce
Rhamnaceae	*Berchemia discolor* Hemsl.	Muchuk (e, h)	Wild	Fruit, gum	Fruit, seed	May, Jul–Sep	Boiled	Sun-dried	Scarce, abundant
	Ziziphus mauritiana Lam.	Angaw (a), tilak (e, g, h), tilomwo (e), tirokwo (e, g, h)	Wild	Fruit, seed	Fruit, seed	Apr–Sep	Boiled, dried	Pickled, sun-dried	Scarce, moderate, abundant
	Ziziphus mucronata Willd.	Angaw (g)	Wild	Fruit	Fruit	Jul–Sep	Dried	Pickled	Moderate
Rubiaceae	*Canthium lactescens* Hiern	Buterwo (b), pkodo (b), ptere (f), ptero (i), putar (b), putere (h), putero (j), putoro (a, b, c, e, f, g, h, i)	Wild	Fruit	Fruit	Jan–Dec	Boiled, dried	Pickled, salted, sun-dried	Scarce, moderate
	Vangueria apiculata K. Schum.	Taparper (a, j)	Wild	Fruit	Fruit	Apr–Sep			
	Vangueria madagascariensis J. F. Gmel.	Kanoy (b), knoy (a), komol (a, d, g), komolwo (a, b, c)	Wild	Fruit	Fruit	Mar, Jul–Sep, Dec	Boiled, dried	Pickled, sun-dried	Scarce, moderate
Rutaceae	*Citrus sinensis* (L.) Osbeck	Machungwa (i), majungwa (i, j)	Wild, cultivated	Fruit	Fruit	Apr–Jul			Scarce
	Teclea nobilis Delile	Kuoi, kurion (c, f, h)	Wild	Fruit	Fruit	Jan–Mar, May–Jun			Moderate, abundant

Salvadoraceae	*Dobera glabra* (Forssk.) Poir.	Koros (c, g), korosion (a, c, f, g), keresion (c, g)	Wild	Fruit, gum, pulse	Fruit, seed	Dec–Mar, Jul–Sep			Scarce, moderate
	Salvadora persica L.	Asiokon, chokow'o (i)	Wild	Fruit	Fruit	Jul–Sep			
Sapindaceae	*Haplocoelum foliolosum* (Hiern) Bullock	Malkat (h)	Wild	Fruit	Fruit	Oct–Dec	Boiled	Salted	Moderate
Solanaceae	*Lycopersicon esculentum* Mill.	Nyanya (j)	Cultivated	Vegetable	Fruit	Apr–Jun	Cooked	Pickled	Moderate
	Lycium europaeum L.								
	Solanum nigrum L.	Kolow (e), ksoiyo (a, e, f, g, h, j), manaku (e)	Wild, cultivated	Vegetable	Leaves	Mar–Aug	Boiled	Pickled	Scarce, moderate, abundant
	Solanum tuberosum L.	Irish potatoes (d), potato leaves (d)	Cultivated	Vegetable	Tuber	Apr–Jun	Dried	Sun-dried	Moderate
Sterculiaceae	*Sterculia stenocarpa* H. J. P. Winkl.	Alil (e)	Wild	Cereal	Seed	Oct–Dec			
Verbenaceae	*Lippia kituiensis* Vatke	Mersayan (f)	Wild	Vegetable	Leaves	Jul–Sep			
Vitaceae	*Cyphostemma bambuseti* (Gilg and M. Brandt) Desc. ex Wild and R. B. Drumm.	N/a (f)							Moderate
	Cyphostemma sp. (Planch.) Alston	Kamtoroloo (h), kantido (a)	Wild	Cereal, fruit, vegetable	Fruit, leaves, seed	Jul–Sep	Dried	Pickled, sun-dried	Moderate, abundant
Ximeniaceae	*Ximenia americana* L.	Kinyat (b, c, d, f, i, j), kunyotwo (b, c, d, f, i, j)	Wild	Fruit	Fruit	Jan–Mar, May, Jul–Sep, Nov	Dried	Sun-dried	Scarce, moderate, abundant
Zygophyllaceae	*Balanites aegyptiacus* (L.) Delile	Sabatit (e, f), sapatit (e), tuyun (b, c, e, f, g, h, i, j), tuyunwo (b, c, e, f, g, h, i)	Wild	Cereal, fruit, vegetable	Flower, fruit, leaves, seed	Jan–Dec	Cooked, dried	Pickled, sun-dried	Scarce, moderate, abundant
	Balanites rotundifolia (Tiegh.) Blatt.	Loma (i), lomaa (f, g)	Wild	Cereal, fruit, pulse	Fruit, seed	Jan–Mar, Jul–Sep	Boiled	Sun-dried	Scarce, moderate
	Tribulus terrestris L.	Asukuru (j)	Wild	Vegetable	Fruit, leaves	Apr–Jun	Cooked	Pickled	Moderate
Unidentified	Not identified	Akan (a, b, h, i)	Wild	Staple, vegetable	Root	Jan–Mar, May–Jun, Sep–Dec			Scarce, moderate, abundant

continued

APPENDIX 1A. Edible plant species known in Tangulbei and Churo divisions in eastern Baringo District, Kenya[a] *(continued)*

Botanical family	Scientific name	Vernacular name(s)[b]	Habitat	Specific use	Part used	Seasonality	Preparation	Conservation	Availability
	Not identified	Amanyang (i)	Wild	Vegetable	Leaves	Apr–Jun			
	Not identified	Arewia (i)	Wild	Fruit	Fruit	Jul–Sep			
	Not identified	Chemwong (e)	Wild	Staple	Root	Apr–Jun			
	Not identified	Chepcho (d)	Wild	Vegetable	Leaves	Jul–Sep	Cooked	Sun-dried	
	Not identified	Chepkatoi (f)	Wild	Vegetable	Leaves	Apr–Jun			
	Not identified	Chepkotiway (f)	Wild	Vegetable	Leaves	Apr–Jun			
	Not identified	Cheptopoy							
	Not identified	Dryak (c)	Wild	Fruit	Fruit	Jan, Nov			
	Not identified	Epee (b)							Scarce
	Not identified	Hyphoxis							
	Not identified	Kadomwo (f)	Wild	Fruit	Fruit	Apr–Jun			
	Not identified	Kajiijilila (f)	Wild	Fruit	Fruit	Jul–Sep			
	Not identified	Kamintril (a)	Wild	Vegetable	Leaves	Jul–Sep	Dried	Pickled	Scarce
	Not identified	Kamtorol (h)	Cultivated	Cereal	Seed	Jul–Sep	Dried	Sun-dried	Moderate
	Not identified	Kamurmur (d)				Jan–Feb			Abundant
	Not identified	Kanoy/know/kinoi/kunoy							
	Not identified	Kantrulu							
	Not identified	Kaptirmam (d, i, j)							Moderate
	Not identified	Kaptirmam (g)							Scarce
	Not identified	Kaptirman							
	Not identified	Kata korngoro (i)	Wild	Vegetable	Leaves	Feb–Mar			Moderate
	Not identified	Kekewo (f)	Wild	Cereal	Seed	Jul–Sep			
	Not identified	Kelelepcho (a)	Wild	Vegetable	Root	Sep			Scarce
	Not identified	Kelp po kukuy							
	Not identified	Kepho kuki (h)	Wild	Vegetable	Leaves	Jan–Mar, Jul–Oct	Boiled	Pickled	Moderate
	Not identified	Kinoi							
	Not identified	Kipkodo/pkodo/pka-do/pokoden (h, j)	Wild	Vegetable	Root	Jan–Dec	Boiled, dried	Pickled, sun-dried	Scarce
	Not identified	Kolopcho (c, j)	Wild	Vegetable	Root	Apr–Jun	Dried	Pickled	Scarce
	Not identified	Kolow							

	Not identified	Kolyon							
	Not identified	Kparkach (a)				Jun			Scarce
	Not identified	Kparkach/parkach (c)							Abundant
	Not identified	Kptumeiwo (f)	Wild	Vegetable	Leaves	Aug			Moderate
	Not identified	Krus (f, h)	Wild	Pulse	Seed	Feb, May–Jun			Scarce, abundant
	Not identified	Kuntoro (i)	Wild	Vegetable	Leaves	Jul–Sep			
	Not identified	Lopara, lopero (c)	Wild	Fruit	Fruit	Jan–Mar, Jul–Oct	Boiled	Pickled	Scarce
	Not identified	Lopchan (d)	Cultivated	Vegetable	Leaves	Jan–Mar	Dried	Sun-dried	Moderate
	Not identified	Lordo (j)	Wild	Fruit, vegetable	Fruit, leaves	Jan–Mar, Jul–Oct	Boiled	Pickled	Abundant
	Not identified	Morak (c)	Wild	Pulse	Seed	Dec–Feb			Scarce
	Not identified	Najingoyo							
	Not identified	Naschart							
	Not identified	Norok							
	Not identified	Omorwo (j)	Wild	Fruit	Fruit	Jan–Mar			
	Not identified	Polak (d, f)	Wild	Fruit	Fruit	Jul–Sep	Raw	Sun-dried	Scarce
	Not identified	Poromonion (h)	Wild	Condiment	Seed	Apr–Jun, Nov–Dec	Dried	Pickled	Moderate
	Not identified	Robwin							
	Not identified	Sachan (b)	Wild	Vegetable	Leaves	Apr–Jun			
	Not identified	Sakian (e)	Wild	Vegetable	Leaves	Apr–Jun			
	Not identified	Simadado (j)	Wild	Fruit	Fruit	Apr–Jun, Nov–Dec	Dried	Pickled	Scarce
	Not identified	Siyoyawo (j)	Wild	Fruit	Fruit	Jul–Sep			
	Not identified	Tabodiny (h)	Wild	Vegetable	Root	May–Jun			Abundant
	Not identified	Takawia							
	Not identified	Tapoclin (a, i)	Wild	Vegetable	Root	Sep–Oct			Scarce, moderate
	Not identified	Tipai (f)				Feb			Scarce
	Not identified	Yitopowawa (i, j)	Wild	Vegetable	Leaves	Apr–Sep	Cooked	Pickled	Moderate

a. N/d or blank space means no information available.

b. Vernacular name under which species is known in (a) Amaiya, (b) Chemoikut, (c) Chepelow, (d) Churo, (e) Kechii, (f) Komolion, (g) Orus, (h) Putoro, (i) Tangulbei, (j) Tebelekwa. Amaiya, Chepelow, Churo, Putoro, and Tebelekwa are situated in Churo Division; Kechii, Chemoikut, Komolion, Orus, and Tangulbei are situated in Tangulbei Division.

APPENDIX 1B. Edible animal species known in Tangulbei and Churo Divisions in eastern Baringo District, Kenya[a]

English name	Vernacular name[b]	Type	Parts consumed	Availability
Antelope	Akwete (g, j), chemul (c)	Mammal	Muscle, organs	Scarce, moderate
Baboon	Mayos (f, h), mongoes (e), moyos (c)	Mammal, primate	Muscle, organs	Scarce, moderate, abundant
Buffalo	Soo (a, c, f)	Mammal	Muscle, organs	Scarce, moderate
Chameleon	Chepanyirit (b)	Reptile		Scarce
Dik dik	Cheptikich (h) (a), siran (a, b, d, g, i, j)	Mammal	Muscle, organs	Scarce, moderate, abundant
Dove	Cheprim (j), cheprum (h), chepurum (b, c, i), kapulukeret (g), kiptuko (b), ptuko (f)	Bird	Eggs, muscle, organs	Scarce, moderate, abundant
Eland	Asarich (b, g), kiptuko (c)	Mammal	Muscle, organs	Scarce, moderate
Gazelle	Akwete (g, j), chemul (c, g)	Mammal	Muscle, organs	Scarce, moderate
Grasshoper	Kaperwo (f), kapowo (b), kaperon (d, j), kaperrwo (h), kaperwo (c), talamia (h)	Insect	Muscle, organs	Scarce, moderate
Guinea fowl	Mangarach (a, b, c, d, e, f, g, h, i)	Bird	Eggs, muscle, organs	Scarce, moderate, abundant
Hare	Plekwa (j)	Mammal	Muscle	Scarce
Hyrax	Atokoro (g), kaner (b)	Mammal	Muscle, organs	Scarce, moderate
Kudu	Seromat (i), soromot (b)	Mammal	Muscle, organs	Scarce
Lizard	Cherangus (f, j), cherungas (b), ngokai (f)	Reptile	Eggs, muscle, organs	Scarce, moderate
Monkey	Kima (e), warany (h)	Mammal, primate	Muscle	Scarce, moderate
Ostrich	Akales (e, h)	Bird	Eggs, muscle, organs	Moderate
Porcupine	Saput (h)	Mammal, rodent	Muscle	Moderate
Rat	Mirian (d, h)	Mammal, rodent	Muscle	Moderate, abundant
Squirrel	Akanyuk (h)	Mammal, rodent	Muscle	Moderate
Termite	Mokog (c), mokoy (b), piyepiy (b), pryeply (c), pyepai (f), pyepai (h), pyepye (g), pypai (a), talam (c)	Insect	Muscle, organs	Scarce, moderate
Tortoise	Pkokoch (f)	Reptile	Eggs, organs	Moderate
Warthog	Mulonjo (c), mulunto (f)	Mammal	Muscle, organs	Scarce, moderate
Waterbuck	Cheptanuru (c)	Mammal	Muscle	Scarce
Weaver bird	Sewach (h)	Bird	Muscle	Moderate
Wild pig	Pturuny (f)	Mammal	Muscle	Moderate
Zebra	Chemarmar (b, c, e, f, i), chemurur (a)	Mammal	Muscle	Scarce, moderate
Not identified	Aluru (a, g)	Bird	Eggs, muscle	Scarce, moderate
Not identified	Atokoro (f)	Bird	Eggs, organs	Moderate
Not identified	Chepturkich (g)	Mammal	Muscle	Moderate
Not identified	Chrangae (d)	Bird	Muscle	Abundant
Not identified	Crokoi (j)	Insect	Muscle	Moderate
Not identified	Kechiiryo molok (b)	Bird	Eggs, organs	Scarce

continued

APPENDIX 1B. Edible animal species known in Tangulbei and Churo Divisions in eastern Baringo District, Kenya[a] *(continued)*

English name	Vernacular name[b]	Type	Parts consumed	Availability
Not identified	Kutombo (f)	Insect	Muscle	Moderate
Not identified	Mokoi (a)	Insect	Muscle	Scarce
Not identified	Nalepto (f)	Insect	Muscle	Moderate
Not identified	Naleputo (g)	Insect	Muscle	Scarce
Not identified	Naleputo (h)	Insect	Muscle	Moderate
Not identified	Ngokoy (g)	Insect	Muscle	Scarce

a. Blank space means no information available.
b. Vernacular name under which species is known in (a) Amaiya, (b) Chemoikut, (c) Chepelow, (d) Churo, (e) Kechii, (f) Komolion, (g) Orus, (h) Putoro, (i) Tangulbei, (j) Tebelekwa. Amaiya, Chepelow, Churo, Putoro, and Tebelekwa are situated in Churo Division; Kechii, Chemoikut, Komolion, Orus, and Tangulbei are situated in Tangulbei Division.

APPENDIX 1C. Edible mushrooms known in Tangulbei and Churo Divisions in eastern Baringo District, Kenya[a]

Vernacular name[a]	Habitat	Specific use	Seasonality	Availability
Arowos (i)	Wild	Mushroom	Apr–Jun	
Ata (f)	Wild	Mushroom	Jul–Sep	
Atayon (a)	Wild	Mushroom	Aug	Scarce
Aten (f)	Wild	Mushroom	Jul–Sep	
Atoketiomogh (j)	Wild	Mushroom	Apr–Jun	Scarce
Chepkechir (f)	Wild, cultivated	Mushroom	N/A[a]	Scarce
Kasam (e)	Wild	Mushroom	Sep	Moderate
Kelpo mogh (f)	Wild	Mushroom	Apr–Jun, Nov–Dec	Scarce
Kelyomough (a, f)	Wild	Mushroom	Jul, gathering	
Kelyomough (c, e, g)	Wild	Mushroom	Mar, Sep, gathering	Scarce, moderate
Sonsor (f)	Wild	Mushroom	Jul–Sep	

a. N/A: no information available.
b. Vernacular name under which species is known in (a) Amaiya, (b) Chemoikut, (c) Chepelow, (d) Churo, (e) Kechii, (f) Komolion, (g) Orus, (h) Putoro, (i) Tangulbei, (j) Tebelekwa. Amaiya, Chepelow, Churo, Putoro, and Tebelekwa are situated in Churo Division; Kechii, Chemoikut, Komolion, Orus, and Tangulbei are situated in Tangulbei Division.

APPENDIX 2. Locally available foods in eastern Baringo District, Kenya, that contribute more than 5% to the cost, energy, and nutrient

Variable	> 5% contribution in dry season 6–8 mo	9–11 mo	12–23 mo	Woman, pregnant woman, or lactating woman[a]
Cost	Cow's milk, egg, guava, camel's milk, dried small fish, ginger	Cow's milk, camel's milk, small dried fish, egg	Cow's milk, egg, camel's milk, tomato, small dried fish, goat meat, camel meat	Egg, camel's milk, tomato, small dried fish, goat meat, camel meat
Energy	Breastmilk, maize, millet	Breastmilk, maize, kidney beans, cow's milk	Breastmilk, maize, kidney beans, egg, cow's milk, mung beans	Maize, egg, dried peas, mung beans, kidney beans, beef meat, small dried fish, avocado, camel meat, goat meat
Nutrients				
Protein	Breastmilk, kidney beans, dried small fish, egg, cow's milk, dried peas	Breastmilk, kidney beans, small dried fish, cow's milk, dried peas, mung beans, maize, egg	Kidney beans, small dried fish, breastmilk, egg, mung beans, maize, cow's milk, goat meat, camel meat	Small dried fish, egg, dried peas, mung beas, maize, goat meat, camel meat, kidney beans, beef meat
Fat	Breastmilk, cow's milk	Breastmilk, cow's milk	Breastmilk, egg, cow's milk, goat meat, camel meat	Egg, avocado, beef meat, camel meat, goat meat, maize, *camel's milk*, small dried fish
Vitamin A	Beef liver, breastmilk, goat liver	Beef liver, breastmilk, kale	Beef liver, breastmilk, kale, egg	Beef liver, kale, egg
Vitamin C	Breastmilk, guava, mango, kale	Breastmilk, kale, green chili	Breastmilk, tomato, kale, green chili	Tomato, kale, green chili, lemon
Vitamin B_1	Breastmilk, maize, kidney beans, millet, mung beans, dried peas	Breastmilk, maize, kideny beans, mung beans, dried peas, cow's milk	Maize, kidney beans, breastmilk, mung beans, tomato, cow's milk	Maize, mung beans, dried peas, tomato, kidney beans
Vitamin B_2	Breastmilk, beef liver, cow's milk, goat kidney, egg	Breastmilk, cow's milk, goat kidney, beef liver, egg, maize	Goat kidney, breastmilk, egg, cow's milk, maize, beef liver	Goat kidney, egg, beef liver, maize, *tomato*
Niacin	Breastmilk, dried small fish, maize, kidney beans, beef liver, cow's milk	Breastmilk, dried small fish, kidney beans, maize, cow's milk, dried peas, mung beans	Breastmilk, small dried fish, kidney beans, maize, egg, mung beans, camel meat, goat meat, cow's milk	Small dried fish, maize, egg, dried peas, mung beans, camel meat, goat meat, beef meat, kidney beans, *beef liver*
Vitamin B_6	Breastmilk, maize, millet, cow's milk, kidney beans, guava, mango	Maize, breastmilk, kidney beans, cow's milk, dried peas, kale, small dried fish, mung beans	Maize, kidney beans, tomato, cow's milk, egg, kale, small dried fish, mung beans	Maize, tomato, avocado, dried peas, egg, kale, small dried fish, mung beans, kidney beans, camel meat, goat meat
Folic acid	Breastmilk, kidney beans, mung beans, dried peas	Breastmilk, kidney beans, mung beans	Kidney beans, mung beans, breastmilk, egg	Mung beans, dried peas, kidney beans, egg, *tomato*
Vitamin B_{12}	Beef liver, goat kidney, breastmilk, goat liver, dried small fish	Beef liver, goat kidney, small dried fish, breastmilk	Goat kidney, beef liver, small dried fish, breastmilk	Beef liver, goat kidney, small dried fish
Calcium	Breastmilk, small dried fish, cow's milk, finger millet	Breastmilk, small dried fish, cow's milk	Small dried fish, breastmilk, cow's milk	Small dried fish, egg
Iron	Breastmilk, kidney beans, maize, dried peas, mung beans, beef liver, finger millet, egg, goat kidney	Kidney beans, maize, dried peas, breastmilk, mung beans, goat kidney, beef liver	Kidney beans, maize, mung beans, egg, goat kidney, breastmilk	Maize, dried peas, mung beans, kidney beans, egg, goat kidney, *beef liver*, small dried fish
Zinc	Breastmilk, kidney beans, maize, cow's milk, camel's milk, dried small fish, mung beans, beef liver, finger millet, dried peas	Camel milk, breastmilk, kidney beans, maize, cow's milk, small dried fish, mung beans, dried peas	Kidney beans, maize, breastmilk, camel's milk, small dried fish, mung beans, camel meat, goat meat, egg, cow's milk	Camel milk, maize, small dried fish, mung beans, camel meat, goat meat, dried peas, egg, beef meat, kidney beans
Copper				Beef liver, mung beans, dried peas, kidney beans, maize, tomato, avocado, kale, small dried fish

a. The contribution of foods to cost, energy, and nutrients was not very different between lactating, pregnant, and nonlactating/nonbreastfeeding women; therefore all the foods were taken together in this column. Foods in italics did contribute more than 5% for at least one category of women; foods not in italics contributed more than 5% for all three categories of women.

needs in the LACON modeled diets for different age groups

> 5% contribution in wet season			
6–8 mo	9–11 mo	12–23 mo	Woman, pregnant woman, or lactating woman[a]
Cow's milk, goat's milk, goat meat, dried small fish	Cow's milk, egg, goat meat, small dried fish, camel meat	Egg, goat meat, small dried fish, goat's milk, camel meat, cowpeas	Egg, tomato, goat meat, small dried fish, camel meat
Breastmilk, goat's milk, maize	Breastmilk, maize, cow's milk	Breastmilk, maize, egg, goat's milk, mung beans, cowpeas	Maize, avocado, egg, *dried peas*, cowpeas, mung beans, small dried fish, goat meat, camel meat
Breastmilk, goat's milk, dried small fish, cow's milk	Breastmilk, small dried fish, cow's milk, kidney beans, dried peas, mung beans, cowpeas, maize, camel meat, goat meat	Small dried fish, breastmilk, egg, mung beans,, cowpeas, maize,, dried peas, camel meat, goat meat, goat's milk	Small dried fish, egg, dried peas, mung beans, cowpeas, maize, camel meat, goat meat
Breastmilk, goat's milk	Breastmilk, cow's milk	Breastmilk, egg, goat's milk, camel meat, goat meat	Avocado, egg, goat meat, camel meat, maize, small dried fish
Goat liver, breastmilk, carrot	Goat liver, breastmilk	Goat liver, breastmilk, kale, egg	Goat liver, kale, egg
Breastmilk, kale	Breastmilk, green chili, cowpea leaves	Breastmilk, kale, cowpea leaves, tomato	Tomato, kale, green chili, cowpea leaves, avocado
Breastmilk, maize, goat's milk, mung beans, cowpeas, dried peas, kidney beans	Breastmilk, maize, cowpeas, mung beans, kidney beans, dried peas, cow's milk	Maize, breastmilk, cowpeas, mung beans, dried peas, goat's milk	Maize, mung beans, cowpeas, dried peas, tomato, avocado
Breastmilk, goat's milk, cow's milk, goat liver, kidney beans	Breastmilk, cow's milk, goat kidney, goat liver, egg, maize	Goat kidney, breastmilk, egg, goat's milk, goat liver, maize	Goat kidney, egg, goat liver, maize, avocado, *tomato*
Breastmilk, goat's milk, dried small fish, maize	Breastmilk, small dried fish, maize, cow's milk, kidney beans, dried peas	Breastmilk, small dried fish, maize, egg, mung beans, camel meat, cowpeas, goat meat, dried peas, goat's milk	Small dried fish, maize, egg, avocado, *dried peas*, mung beans, cowpeas, camel meat, goat meat
Breastmilk, goat's milk, maize, goat's milk, cowpea leaves	Maize, breastmilk, cow's milk, cowpea leaves, kidney beans, dried peas, small dried fish	Maize, cowpea leaves, breastmilk, egg, kale, small dried fish, dried peas, mung beans, cowpeas	Avocado, maize, cowpea leaves, tomato, *dried peas*, egg, kale, small dried fish, mung beans, cowpeas
Breastmilk, mung beans, cowpeas, dried peas, kidney beans	Breastmilk, mung beans, cowpeas, kidney beans, dried peas	Cowpeas, mung beans, breastmilk, dried peas	Mung beans, cowpeas, dried peas, avocado, *egg*
Goat liver, goat kidney, breastmilk, small dried fish	Goat liver, goat kidney, small dried fish, breastmilk	Goat kidney, goat liver, small dried fish, breastmilk, egg	Goat liver, goat kidney, small dried fish, *egg*
Breastmilk, goat's milk, small dried fish, cow's milk	Breastmilk, small dried fish, cow's milk	Small dried fish, breastmilk, goat's milk	Small dried fish, egg
Breastmilk, maize, dried peas, kidney beans, mung beans, cowpeas, goat liver, goat kidney	Maize, kidney beans, dried peas, breastmilk, mung beans, cowpeas, goat kidney, goat liver	Maize, cowpeas, mung beans, dried peas, goat kidney, millet flour, breastmilk	Maize, *dried peas*, cowpeas, mung beans, egg, goat kidney, cowpea leaves, *goat liver*
Breastmilk, goat's milk, maize, cow's milk, small dried fish, cowpeas, mung beans	Breastmilk, maize, cow's milk, small dried fish, cowpeas, mung beans, kidney beans, camel meat, goat meat, dried peas	Maize, breastmilk, small dried fish, mung beans, cowpeas, camel meat, goat meat, egg, dried peas	Maize, small dried fish, cowpeas, mung beans, goat meat, camel meat, *dried peas*, egg
			Goat liver, avocado, mung beans, cowpeas, dried peas, maize, tomato, kale, small dried fish